On the Relation between Verb Inflection and Verb Position in Dutch Agrammatic Aphasics

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This study focuses on the relation between verb position and verb inflection in the speech production of Dutch agrammatic patients. In Dutch, the finite verb is moved to second position in the matrix clause (de jongen leest een boek: the boy reads a book), but remains in its base generated, that is final, position in the embedded clause (ik zie dat de jongen een boek leest: lit. I see that the boy a book reads). Nonfinite verbs (infinitives and participles) are always in clause final position. Spontaneous speech analysis shows that agrammatics are sensitive to this relation between finiteness and structural position, although they are reluctant to produce finite verbs. Experimental data shows that verb inflection as such is not the problem: these patients are perfectly able to produce a finite verb in final position in an embedded clause; this is not more difficult than producing a nonfinite verb in the same position. If the finite verb has to be produced in Verb Second position in the matrix clause, however, the patients’ performance drops dramatically. © 1998 Academic Press

INTRODUCTION

Agrammatism is characterized by a spoken output in which grammatical morphemes are omitted and substituted. The observation that patients differ in their omission and substitution patterns is reason for some authors to assume different underlying disorders among patients (e.g. Miceli, Silveri, Romani, & Caramazza, 1989) or employment of different registers (Kolk & Heeschen, 1992). Grodzinsky, Swinney, and Zurif (1985) and Grodzinsky (in press) argue that differences in omission and substitution patterns are

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due to language variation rather than subject variation and that morphological errors are the consequence of syntactic rather than morphological problems.

Recently, two generative syntactic explanations for the morphological production errors have been proposed. The first is from Hagiwara (1995) and the second from Friedmann and Grodzinsky (1997). Although these theories differ with respect to the question of where the errors arise, they both predict that projections “‘high in the tree’” are hard to realize for agrammatics. These theories are particularly important in relation to verb inflection, as verb inflection is notoriously difficult for agrammatics (see, e.g., Miceli et al. (1989) for Italian-speaking agrammatics; Saffran, Berndt, & Schwartz (1989) for English-speaking agrammatics; Bastiaanse, Jonkers, & Moltmaker-Osinga (1996) for Dutch agrammatics). In the present study the focus is on the relation between inflection and structural position of the verb in Dutch agrammatics. Dutch is a very appropriate language for studying this topic, since there is a strong connection between verb inflection and word order.

First, the position of the verb in Dutch matrix and embedded clauses will be elucidated. Subsequently, the theories of Hagiwara (1995) and Friedmann and Grodzinsky (1997) will be discussed, resulting in the hypothesis that agrammatic patients will have problems in producing inflected verbs in Verb Second, but not in clause final position. Then, the two parts of the study will be presented. The first concerns a spontaneous speech analysis to the relation between verb position and verb inflection in agrammatics. The second study is an experiment to test agrammatics’ ability to inflect verbs. Finally, the results will be discussed and implications for related issues will be addressed.

Verb Movement in Dutch

Dutch has been analyzed as an SOV-language, meaning that the base-generated position of the verb is after the object (Koster, 1975). In the Dutch declarative matrix sentence, the finite verb has to be moved to second position. This movement is known as Verb Second. If the main verb clusters with a modal verb or auxiliary, the main verb remains in situ and the modal verb or auxiliary is moved to the Verb Second position. This is illustrated in (1)–(4), where $t$ designates the canonical verb position, which is co-indexed with the Verb Second position.

(1) matrix sentence with modal verb

\[
\begin{array}{c}
de \text{ boer} & \text{ wil}_i & \text{ de koe} & \ota_i & \text{ melken} \\
\text{the farmer} & \text{ wants} & \text{ the cow} & (\text{to}) \text{ milk} \\
\text{(the farmer wants to milk the cow)}
\end{array}
\]

(2) matrix sentence without modal verb/auxiliary

\[
\begin{array}{c}
de \text{ boer} & \ota_i & \text{ melkt}_i & \text{ de koe} & \ota_i \\
\text{the farmer} & \text{ milks} & \text{ the cow}
\end{array}
\]
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(3) embedded clause with modal verb
(ik denk) dat de boer de koe wil melken
(I think) that the farmer the cow wants to milk
(I think that the farmer wants to milk the cow)

(4) embedded clause without modal verb/auxiliary
(ik denk) dat de boer de koe melkt
(I think) that the farmer the cow milks
(I think that the farmer milks the cow)

In Figs. 1a–1d the syntactic trees picturing these clauses are given. Here it is assumed that a verb is inserted in the structure in fully inflected form (Chomsky, 1995; for Dutch syntax, see Zwart, 1993). In the embedded clause, the finite verb remains in its base-generated position; in matrix clauses, only the finite verb moves to the left, the nonfinite verb stays behind.

In these diagrams, the verb moves to I in a simple Subject–V_{fin}–Object (X) matrix clause (V-to-I, 1a-b); the verb remains in its original position in the embedded clause, where I is not lexical (Figs. 1c–1d).

Two Structural Accounts for Verb Inflection Problems in Agrammatism

Recently, two papers have been published that provide a syntactic explanation for the impaired production of grammatical morphemes in the speech of agrammatic patients: Hagiwara (1995) and Friedmann and Grodzinsky (1997). According to Hagiwara, positions “high in the syntactic tree” are difficult for agrammatics. This means that agrammatics are unable to project CP, and therefore no movement to C is possible. She suggests that this holds for both comprehension and production and presents examples from several languages to support her theory. What does Hagiwara’s theory predict for Dutch? For Hagiwara, Verb Second is V-to-C, and as CP is the highest projection, she predicts that finite verbs in second position in Dutch matrix clauses are difficult to realize for an agrammatic patient. This inability to fill the C-position also implies that agrammatics cannot produce sentence embeddings, because in an embedded clause either C or [specCP] is lexically visible. If, however, the embedded clause is formed for the patient, he should be able to realize the finite verb, since this verb remains in its base-generated position. Hence, Hagiwara’s theory predicts that Dutch agrammatics have problems with inflected verbs in the matrix clause, but that they should be

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We use I as the functional head hosting the raised finite verb. According to Zwart (1993) V raises to I if the subject is in SpecIP and to C in other cases. Den Beste (1989), among others, claims that Verb Second is always V-to-C. In the present study, the existence of Verb Second, as opposed to verb final (in non-root sentences) is relevant. We offer no contribution to the syntactic complementation of Verb Second.
able to produce finite verbs in embedded clauses, where no movement from V to C (or I) occurs.

Friedmann and Grodzinsky (1997) present an agrammatic patient who has severe problems with the tense aspect of the verb inflection, though not with agreement. They account for these data by assuming, according to Pollock’s 1989 theory, *split inflection* (I → tense (T) and agreement (Agr); compare the tree in Fig. 2).

Apart from the problems with the tense aspect, Friedmann and Grodzin-
sky’s patient was unable to produce wh-elements, copulas, and complementizers, motivating them to formulate the following hypothesis:

(a) C, T, or Agr is underspecified in agrammatism, and
(b) An underspecified node cannot project any higher.

They call this the Pruned Tree Hypothesis. This hypothesis is based on the findings in one single patient and tested on other single case studies from the literature. Friedmann and Grodzinsky suggest that the location of the pruning may be a matter of severity of aphasia.

Here, Hagiwara’s and Friedmann and Grodzinsky’s hypotheses are taken together and reformulated for a group study to the ability of Dutch agrammatics to inflect verbs. As we were interested in verb inflection in general, we abstracted from split verb inflection: the tense and agreement nodes are taken together in one inflection node. For this group study, the hypothesis is:

In agrammatism, the production of finite verbs is affected in Verb Second but not in clause final position, since movement to functional projections “high in the syntactic tree,” in this case in I, are difficult to realize.

This is not taken to be a matter of all or nothing. Most agrammatics will be able to realize Verb Second occasionally, but the degree of this ability may vary with the severity of the grammatical impairment.

It is this hypothesis that has been tested in the present study. First, the relation between verb position and verb inflection in spontaneous speech of three agrammatic patients has been analyzed. The hypothesis predicts that

![Fig. 2. Syntactic tree with split inflection nodes.](image-url)
Table 1

Number of Verbs in the Spontaneous Speech of Three Agrammatics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Finite</th>
<th>Infinitive</th>
<th>Participle</th>
<th>Nonfin. tot.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10 (10)</td>
<td>12 (12)</td>
<td>6 (6)</td>
<td>18 (18)</td>
<td>28 (28)</td>
</tr>
<tr>
<td>2</td>
<td>20 (20)</td>
<td>9 (9)</td>
<td>3 (3)</td>
<td>12 (12)</td>
<td>32 (32)</td>
</tr>
<tr>
<td>3</td>
<td>15 (15)</td>
<td>16 (15)</td>
<td>—</td>
<td>16 (15)</td>
<td>31 (30)</td>
</tr>
<tr>
<td>Total</td>
<td>45 (45)</td>
<td>37 (36)</td>
<td>9 (9)</td>
<td>46 (45)</td>
<td>91 (90)</td>
</tr>
</tbody>
</table>

Note. Between brackets is the number of times the verb occurred in correct position (V2 for finite verbs, clause final for the nonfinite verbs).

projections to I are problematic and therefore no Verb Second will occur. Instead, the agrammatics will produce verbs in clause final position.

Second, an experiment has been conducted to evaluate the relationship between finiteness and clause position more precisely. This experiment tests the hypothesis that for Dutch agrammatics the finite verb is difficult to realize in Verb Second position, that is, in the matrix clause, but will not be problematic if no movement is required, that is, in the embedded clause.

SPONTANEOUS SPEECH ANALYSIS

Methods

The spontaneous speech of three agrammatics was analyzed with respect to the position and inflection of the verbs. The samples were taken from previous studies from our research group (Bastiaanse, Jonkers, & Ruhland, 1991; Jonkers & Bastiaanse, 1996). The samples were transcribed orthographically and were analyzed with respect to verb inflection. Each clause containing at least one verb / auxiliary / modal / copula was taken into account. First, the clauses containing a finite form were analyzed. It was scored whether the finite verb was in the correct position, that is, Verb Second position. Since these patients speak in telegraphic speech, their utterances are very short. Therefore, the second position is often the final position as well. Apart from that, the first constituent may be dropped, resulting in a sentence initial finite verb (e.g., *weet ik niet*: lit. *know I not* = I don’t know instead of *dat weet ik niet*: lit. *that know I not*). This is not uncommon in spoken Dutch. In such cases the inflected verb is considered to be in the proper Verb Second position. If a modal verb or an auxiliary was used, there was sometimes a nonfinite verb in the clause, but these verbs were further ignored (all but one were in correct, that is, clause final position).

The remaining clauses contained either a participle or an infinitive (the nonfinite forms). These verbs were assumed to be in their proper position if they were not followed by another constituent. So, even an isolated nonfinite verb was considered to be clause final (e.g., *lezen*: reading as an answer to the question *how do you spend your day?*). Single word utterances consisting of a finite verb never occurred.

Results

The results of the verb analysis in spontaneous speech are mentioned in Table 1. Normal Dutch speakers inflect verbs in 97% of the instances, meaning that 97% of the clauses they produce contain a finite verb form (Bas-
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The hypothesis correctly predicts that the ability of agrammatics to produce finite verbs is severely reduced: only in 49% of the cases in which they produce a verb, this verb is inflected. The results also demonstrate the strong relationship between verb inflection and verb position: inflected verbs are in Verb Second position and nonfinite verbs are all but one in clause final position. Patient 2 (a very mild Broca’s aphasic, see Bastiaanse, 1995 for a case description) produces three finite verbs in clause final position, but these are all embedded clauses marked by a complementizer, and therefore these verbs are in the correct position.

EXPERIMENT

Methods

Subjects. Ten aphasics (6 male, 4 female) participated in this study. According to the ALLOC scores of the Aachen Aphasia Test (Graetz, De Bleser, & Willmes, 1992) and clinical judgment of both the speech therapist and the tester, all 10 patients suffered from Broca’s aphasia: their speech was telegraphic and their comprehension in a conversation was good. Nine patients were right handed; they were aphasic due to a left hemisphere stroke. One patient was left handed; he was aphasic after a right hemispheric stroke. All patients had been aphasic for at least 3 months when tested for the first time. Mean age of the patients was 72.25 years (range 65–83). The individual data are given in the appendix.

Materials. A test for verb production was developed, consisting of four subtests (cf. the sentences in (1)–(4) above):

1. production of nonfinite verbs in final position in matrix clauses,
2. production of finite verbs in second position in matrix clauses,
3. production of nonfinite verbs in final position in embedded clauses,
4. production of finite verbs in final position in embedded clauses.

Within and among the subtests the verbs were matched for frequency and transitivity. Matching on transitivity was done because this factor might influence verb retrieval (Jonkers & Bastiaanse, 1996). All items concerned action verbs with similar thematic structures: an agent role for the intransitives and an agent and theme role for the transitives. A total of 40 action verbs were chosen and divided along the matching criteria into either subtest 1 or subtest 2. For each verb a picture was drawn and a sentence was constructed. The sentences were matched for constituent length, meaning that an adjunct was added in case of the intransitive verbs. This was done in view of subtest 2, in which the verb had to be produced in second position. If no adjunct were added, second position would be final position as well and hence the data would be uninterpretable. These sentences were printed under the picture, but the verb was left out.

These 40 items were presented to 35 normal controls, who were selected to match an average aphasia group for age and social background. Based on the results of the normal controls, the subtests (1) and (2) were constructed (2 examples and 10 items each). The verbs in subtest (3) were identical to those in subtest (2) and the items in subtest (4) to those of subtest (1). The items of the final test elicited the intended responses in at least 94% of the normal controls. An example for each subtest is given in Figs. 3a–3d.

As a control test for word retrieval as such, an object naming test was administered. The 30 items were matched for frequency with the verbs and also tested on the normal control subjects, who had no problems in naming the pictures.
Fig. 3. (a–d) Examples of the four subtests of the experiment. The patient is asked to fill in the missing word (infinitive in a and c, finite verb in b and d).

Procedure. The patients were tested twice. In the first session, subtests (1) and (2) were administered: at least 5 weeks later (to avoid retests effects), subtests (3) and (4) were administered. One patient was too ill to be tested for the second time. For him, only the data of subtests (1) and (2) was available.

The pictures were presented one at a time. The sentence was read to the patient and at the dots, the examiner hummed three syllables. The patient was asked to complete the sentence. Of course, the patients were allowed to read the sentence themselves, but no patient was able to do so.
Scoring. First it was established whether the correct lexical item was retrieved. For these correctly retrieved items it was established whether they were correctly inflected. Only correctly retrieved items were taken into account, because we were only interested in inflection, not in lexical or phonemic errors. The proportional scores (number of correctly inflected verbs divided by the number of correctly retrieved verbs) were compared in the four conditions.

Results

In Table 2 the results are given. As mentioned above, one patient (Patient 1) only completed the first part of the study. When we look at lexical retrieval only and ignore inflectional errors, the results show that retrieving a verb in second position is more difficult than retrieving it in clause final position (comparison with nonfinite verb in the matrix clause: $t = 5.16$, $df = 9$, $p < .01$; comparison with the finite form in the embedded clause: $t = 3.88$, $df = 8$, $p < .01$). If only lexical retrieval is taken into account, there is a transitivity effect in two conditions. Transitive verbs are easier to retrieve than intransitive verbs when the nonfinite verb has to be inserted into the matrix clause ($t = 4.41$, $df = 9$, $p < .01$) and when the finite verb has to be inserted into the embedded clause ($t = 2.67$, $df = 8$, $p < .05$). This discrepancy between transitive and intransitive verbs in agrammatism has been reported before (Jonkers & Bastiaanse, 1996) and will not be discussed here.
### TABLE 2
Numbers Correctly Retrieved (lex+) and Correctly Inflected (infl+) Verbs and the Proportion of Correctly Inflected Verbs on the Number of Correctly Retrieved Verbs in the Four Experimental Conditions

<table>
<thead>
<tr>
<th>Patient</th>
<th>( V_{\text{in}} ) lex+</th>
<th>( V_{\text{infl}} ) lex+</th>
<th>( V_{\text{infl}} ) prop</th>
<th>( V_{\text{infl}} ) lex+</th>
<th>( V_{\text{infl}} ) prop</th>
<th>( V_{\text{infl}} ) lex+</th>
<th>( V_{\text{infl}} ) prop</th>
<th>( V_{\text{infl}} ) lex+</th>
<th>( V_{\text{infl}} ) prop</th>
<th>( V_{\text{infl}} ) lex+</th>
<th>( V_{\text{infl}} ) prop</th>
<th>nouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>7</td>
<td>1.00</td>
<td>9</td>
<td>9</td>
<td>1.00</td>
<td>10</td>
<td>8</td>
<td>0.80</td>
<td>8</td>
<td>8</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>0</td>
<td>0.00</td>
<td>9</td>
<td>9</td>
<td>1.00</td>
<td>8</td>
<td>4</td>
<td>0.50</td>
<td>6</td>
<td>6</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
<td>4</td>
<td>4</td>
<td>1.00</td>
<td>9</td>
<td>9</td>
<td>1.00</td>
<td>6</td>
<td>6</td>
<td>1.00</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>5</td>
<td>1.00</td>
<td>7</td>
<td>7</td>
<td>1.00</td>
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<td>6</td>
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<tr>
<td>5</td>
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<td>0</td>
<td>0.00</td>
<td>3</td>
<td>3</td>
<td>1.00</td>
<td>5</td>
<td>4</td>
<td>0.80</td>
<td>4</td>
<td>4</td>
<td>1.00</td>
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<td>8</td>
<td>6</td>
<td>0.75</td>
<td>9</td>
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<td>1.00</td>
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<td>0.33</td>
<td>7</td>
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<td>1.00</td>
<td>6</td>
<td>5</td>
<td>0.83</td>
<td>8</td>
<td>8</td>
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<td>4</td>
<td>0.80</td>
<td>4</td>
<td>4</td>
<td>1.00</td>
<td>6</td>
<td>6</td>
<td>1.00</td>
<td>7</td>
<td>6</td>
<td>0.86</td>
</tr>
<tr>
<td>9</td>
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<td>0</td>
<td>—</td>
<td>3</td>
<td>3</td>
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<td>0</td>
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<td>1</td>
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<td>4</td>
<td>4</td>
<td>1.00</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Mean</td>
<td>4.1</td>
<td>2.4</td>
<td>0.49</td>
<td>6.0</td>
<td>6.0</td>
<td>1.00</td>
<td>6.4</td>
<td>5.5</td>
<td>0.86</td>
<td>5.7</td>
<td>5.6</td>
<td>0.98</td>
</tr>
</tbody>
</table>

*Note.* The final column gives the number correct on the object naming test (maximum: 30).
Table 3

Statistics of the Comparisons among the Four Experimental Conditions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inflectional comparison</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matrix clause: ( V_{\text{in}} - V_{\text{fin}} )</td>
<td>3.22</td>
<td>7</td>
<td>&lt;.02</td>
</tr>
<tr>
<td>Embedded clause: ( V_{\text{in}} - V_{\text{fin}} )</td>
<td>1.67</td>
<td>7</td>
<td>&gt;.05</td>
</tr>
<tr>
<td><strong>Structural comparison</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_{\text{fin}} ) matrix – embedded clause</td>
<td>1.00</td>
<td>7</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>( V_{\text{fin}} ) matrix – embedded clause</td>
<td>3.80</td>
<td>6</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

As the study focuses on inflection, we were mainly interested in inflectional errors, not in lexical ones. Therefore, a second analysis was performed, in which only those items were included that were correctly retrieved. For these items it was established whether or not they were correctly inflected. Substitution of a finite verb for a nonfinite verb happened only once (by Patient 8). The form the patient produced was plural, past tense, although only one person is in the picture. This is a very infrequent form and may be a hypercorrection. The inflectional errors on the finite verbs are: 13 substitutions of infinitives, 8 substitutions by stems and one tense error.

Two patients (9 and 10) did not retrieve any verbs in second position correctly and hence no proportional scores could be computed. For those comparisons in which the scores could not be computed, these patients were excluded from the analysis. Four comparisons were made: two with regard to clause structure and two with regard to inflection. The statistics are given in Table 3.

In matrix clauses, the patients make significantly more inflectional errors with verbs in second position than with verbs in final position. In embedded clauses hardly any inflectional errors occur with finite verbs: there is no significant difference between production of finite and nonfinite verbs in the embedded condition. Comparison of the two conditions with inflected verbs shows that production of finite verbs in second position (in the matrix clause) is significantly more difficult than production of the same forms in clause final position (in the embedded clause).

There is no effect for transitivity when both lexical retrieval and inflection are taken into account. Although transitive verbs seem to be somewhat easier

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2 In informal Dutch speech the intervocalic /d/ is often omitted (reden → rejen; raden → rajen). The intended word is pronounced as ‘slejen’ and this might be hypercorrected to ‘sleden,’ which happens to be the past tense, plural.

3 Notice that in Dutch the stem is different from the nonfinite form. The nonfinite form is stem + /en/. The stem is the same form as the first person singular, present tense, whereas the nonfinite form is the same as the plural, present tense. For this reason only the third person singular was used (stem + t in Dutch) in conditions in which the verb had to be inflected.
to retrieve than intransitive verbs, the differences do not reach significance in any condition.

The problems that the agrammatics encounter with inflected verbs in matrix clauses are not only caused by lexical retrieval deficits. Notice that the three patients who have the highest scores on the object naming test (2, 6, 7) have inflection problems in the matrix clause; these patients also retrieve relatively many verbs, but are poor in inflection. Patient 8 scores below mean on object naming and does not retrieve many verbs, but the verbs he does produce are inflected. This means that there is no one-to-one relation between (verb) retrieval and the ability to inflect verbs in the Verb Second position.

When the ability to inflect verbs in Verb Second position is compared to the scores on the comprehension test of the Aachener Aphasia Test (see Appendix), there seems to be a relation: Patients 1, 4, and 6 score high on both variables, whereas Patients 2, 3, 5, and 7 have relatively low scores on these tests. If the performance on the comprehension test is considered to be an indication of the severity of aphasia, one may assume that the ability to produce inflected verbs in Verb Second position is related to the degree of severity of aphasia.

Discussion

Agrammatics have problems to realize a finite verb that has to be moved to I, the functional head that is the landing site of Verb Second. In spontaneous speech these patients have a strong tendency to produce nonfinite verbs in their base generated, that is, clause final position. If they produce a finite verb, however, it is properly moved to I. If a finite verb is produced, it is never preceded by more than one constituent and only one (out of 46) nonfinite verb is illegally followed by an adjunct. The fact that movement does not occur without inflection and that the inflected verbs are always moved shows that agrammatics are sensitive to this obligatory relation between finiteness and movement. The spontaneous speech data does not reveal, however, whether the reluctance of agrammatics to produce finite verbs reflects a reduced ability to produce finite verbs or to move verbs. The experimental data shows that finiteness as such is not the problem: agrammatics are perfectly able to produce finite verbs that have not been moved from their base-generated position.

The spontaneous speech data confirms earlier findings by Kolk and Heeschen (1992) for Dutch and German: if a nonfinite verb is produced, it is in clause final position in a vast majority of the cases (over 90%). Kolk and Heeschen describe their findings as patients using the word order of subordinate (embedded) clauses. In terms of the present framework, this is not correct. The elliptical utterances with a nonfinite verb in clause final position do not reflect the order of the embedded clause, but the canonical word order of Dutch. Assuming, as Kolk and Heeschen do, that agrammatics
use the word order of the embedded clause cannot explain why the verb is not inflected. The results of our experiment show that agrammatics are virtually perfect at producing finite verbs in embedded clauses. They are unable, however, to produce embedded clauses themselves, presumably because the CP-nodes and C (the positions for wh-words and complementizers, respectively) are inaccessible as a landing site (Hagiwara, 1995).

In sum, Dutch agrammatics have problems with Verb Second. It is not finiteness itself that is difficult for them, but movement to I. Nevertheless, they are sensitive to the relation between finiteness and structural position. If they produce a finite verb in spontaneous speech, it is always in correct position. If they produce a nonfinite verb, it remains in clause final position.

Implications for two other theories. These findings rule out two other explanations that have been given for the morphological errors, and hence for verb inflection errors, produced by agrammatics. First of all, a morphological account (as, for example, given by Bates & Wulfeck, 1989), that predicts that verb inflection is problematic for agrammatics, independent of the position of the finite verb in the sentence. The present data shows the opposite: Dutch agrammatic aphasics are perfectly able to inflect the verb, as long it is not moved from its base-generated position. If the verb has been moved from its basic position to the second position in the matrix clause, morphological errors arise, but apparently these are not the consequence of an underlying morphological disorder. Dutch agrammatics show that correct verb inflection is no problem, even in compound structures, as long as the verb remains in its base-generated position.

The second one concerns the theories related to the processing capacity limitations. Most of the studies built on this theory concern language comprehension (for example, Caplan & Waters, 1995; Friederici & Frazier, 1992). One exception is Kolk’s adaptation theory (cf. Kolk & Van Grunsven, 1985; Kolk & Heeschen, 1992). Here it is relevant to know that Kolk assumes that the syntactic deficit is due to an underlying disorder in temporal synchrony. The more syntactic information a patient has to process, the more errors he will make, because the sentence traces decay. This theory predicts that processing of two clauses is more difficult than processing of one. This hypothesis was tested in Kolk and Van Grunsven (1985). They presented a sentence anagram test to a group of Dutch agrammatic patients in which the position of the verb was varied: yes/no questions with the finite verb in sentence initial position, adverbial sentences with the verb in second position, progressive sentences with the auxiliary in second position and the verb in final position and embeddings with the verb in final position. The questions and embeddings were preceded by a matrix clause the position of which was given to the patient. For the adverbial sentence, the position of the adverb (first constituent in [specCP]) was given. Kolk and Van Grunsven found that questions and embeddings, both preceded by a matrix clause, were more difficult than simple matrix clauses. This data may seem contradictory to the
results presented above—inflated verbs in matrix clauses are correctly put in second position, whereas embeddings are difficult. One should bear in mind, however, that the verb was inflaected for the patients and as mentioned above, agrammatics are sensitive to the relation between verb inflection and verb position. The results of the Kolk and Van Grunsven study and the data of the present experiment suggest that agrammatics are able to put a verb in its proper position in the matrix clause if it is inflaected for them (Kolk & Van Grunsven), but not the other way around: given the correct position, they are not able to produce the finite verb (present experiment), although they are aware of the relationship between finiteness and structural position (spontaneous speech data). We should be very careful here, however: in Kolk and Van Grunsven the agrammatics did not have to produce anything themselves, they only had to read (silently) and put the constituents in their correct position. In our experiment they had to produce a finite verb themselves, so the data may not be as comparable as they look at first sight, be it that they both concern Dutch word order. The fact that in the present study the finite verb is easier to produce in the embedded than in the matrix clause argues against Kolk’s adaptation theory, because this theory predicts that sentences containing an embedding require more processing load than sentences consisting of a simple SVO matrix clause. In fact, this argument holds against any theory relying on reduced processing capacity.

Agreement versus tense. Friedmann and Grodzinsky (1997) assume split inflaection, that is, separate nodes for tense and agreement in order to explain that their patient makes tense, but not agreement errors. Their Pruned Tree Hypothesis predicts that if the agreement node is underspecified, it cannot project any higher; this implies that if agreement errors are produced, tense errors will also be made (see Fig. 2 above). In the present experiment, the Dutch agrammatics substitute the third person singular, present tense by stems—which correspond to the first person singular, present tense—and by infinitives—which correspond to the third person plural, present tense. Due to these homonym verb forms, it is impossible to say whether these errors are incorrect inflaections or bare stems and infinitives, but, contrary to what Friedmann and Grodzinsky predict, no tense errors are made. Although Friedmann and Grodzinsky’s theory correctly predicts that verb inflaection is affected in the main clause, but intact in the embedded clause, their assumption of consequent underspecification of the tense node is not supported. This may be due to differences between Dutch and Hebrew, the latter having a verb inflaection system that does not allow bare stems/infinitives (Grodzinsky, in press), which forms seem to be used as ‘defaults’ by the Dutch agrammatics.

Production versus comprehension. It has been argued that Broca’s aphasics encounter problems with the production of verbs that have been moved from their base generated position. It has been suggested before that sentences in which constituents have been moved are difficult to comprehend for
agrammatics (e.g., Grodzinsky, 1995; Hickok & Avrutin, 1995). Grodzinsky, however, explicitly excludes head movement, like Verb Second in Dutch: he argues that comprehension of constructions in which head movement has been applied is intact in agrammatism. Taken together with the results of the present study, this suggests a discrepancy between comprehension and production: agrammatics can comprehend structures in which verbs have been moved, but fail to use a moved, inflected verb in production. There are indeed indications that comprehension of verb movement is unaffected. In a study to processing disorders in agrammatic comprehension in German, Friederici & Frazier (1992) compared the following structures:

(5) De Lehrer stellt den Monitor mit der langen Schnur nahe an die Lampe
   The teacher puts the monitor with the long wire close to the lamp

(6) Zeigen Sie mir, wo der Lehrer den Monitor mit der langen Schnur nahe
    an die Lampe stellt
   Show me where the teacher puts the monitor with the long wire close
    to the lamp

The finite verbs are marked in italics. The patient had to choose from two pictures, the distractor picture showing a teacher putting a monitor close to a lamp with a long wire. Friederici and Frazier were studying something else, so there was no control for some relevant factors here, but nevertheless the results are surprising: the embedded constructions with the verb in final position are equally difficult as the matrix constructions in which the verb has been moved to second position.

Grodzinsky and Finkel (1996) tested agrammatics’ sensitivity to verb movement in a grammaticality judgment task (e.g., could they have left town? versus *have they could leave town?). They, again, showed that agrammatics are indeed sensitive to verb movement.

Conclusion. Producing finite verbs that have been moved from their base generated position is difficult for agrammatic aphasics. The experiment discussed in this paper shows that this is not due to morphological disorders. Therefore we conclude that verb movement causes the verb inflection problems in production, although agrammatics are sensitive to the relation between movement and inflection.

Two suggestions for further research emerge from this study: crosslinguistic experiments to find out more about the level of breakdown of the syntactic tree, and cross-modal experiments to establish the exact relationship between verb movement in the production and comprehension of agrammatic patients.

APPENDIX

Data of the individual patients. Gender (m = male, f = female), age, occupation, etiology (etio) with side of the lesion (l = left, r = right), time
post-onset (tpo: years, months), handedness, and the score on the subtest ‘comprehension’ of the Aachen Aphasia test (Graetz et al., 1992). This subtest has four parts and the scores on each part are added: auditory comprehension of words and sentences and visual comprehension of words and sentences; the maximum score is 120.

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REFERENCES


