Object scrambling in Dutch Broca’s aphasia

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Abstract

This study focuses on the production of sentences in which objects have been moved without a change in the order of the thematic roles. In Dutch, the basic word order is subject–adverb–object–verb. The object can be moved over the adverb; this is called object scrambling. The difference between the two word orders is pragmatic in nature: in the basic word order the focus is on the object, in the scrambled order, the focus is on the adverb. The aim of the present study is to evaluate if production of constructions with moved objects is impaired in Broca’s aphasia and if so, whether that is for syntactic or pragmatic reasons. The results show that for individuals with Broca’s aphasia, sentences with the scrambled word order are more difficult to produce than sentences with the basic word order, even if the scrambled order results in a pragmatically more acceptable sentence. This falsifies several theories of production in Broca’s aphasia and shows an interesting parallel to the performance on comprehension tasks.

Keywords: Broca’s aphasia; Object scrambling; Production; Syntactic deficit; Movement

1. Introduction

Characteristics of agrammatic Broca’s aphasia are relatively well-preserved comprehension and telegraphic speech, the latter meaning that the agrammatic speaker produces many content words (nouns and verbs) and omits and/or substitutes bound and free grammatical morphemes (see, for example, Caramazza & Berndt, 1985; Goodglass, 1968; Thompson, Shapiro, & Roberts, 1993). In the last couple of years some researchers have opted for a more linguistic description of agrammatic telegraphic speech.

In 1995, Hagiwara suggested that Broca’s aphasics have problems creating the highest sentential nodes in the syntactic tree, in particular the C-node, both in...
comprehension and in production. In 1997, Friedmann & Grodzinsky hypothesized on the basis of a single case study that the nodes high in the syntactic tree, CP and TP are unavailable for functional projections (the ‘tree pruning hypothesis’). The latter hypothesis has been supported by cross-linguistic data (Friedmann, 2000). It is not just that functional projections are impaired, but as a consequence movement of arguments and adjuncts to the functional domains high in the syntactic tree is impaired as well: several kinds of wh-questions in English, Hebrew, and Arabic are hard for Broca’s aphasics (Friedmann, 2002; Thompson, Shapiro, Tait, Jacobs, & Schneider, 1996).

Bastiaanse, Rispens, Ruigendijk, Juncos, and Thompson (2002a), however, argue that it is not only positions high in the syntactic tree that are difficult for agrammatic speakers, but that production of many other linguistic concepts, which are related to verbs and verb movement, are impaired. They argue, for example, that articles and pronouns are omitted, regardless of their position in the syntactic tree, when no verb is produced. This is predictable from a linguistic point of view, thus showing that the critical factor is syntactic dependency. Syntactic dependency has, of course, much to do with movement, but not only movement to functional projections high in the syntactic tree as suggested by Hagiwara (1995) and Friedmann (2000).

The present study focuses on a movement operation low in the syntactic tree. We hypothesize that syntactic complexity, in a linguistic sense, is the critical factor in agrammatic production, and, therefore, we predict that sentences with object movement will be more difficult than sentences with basic word order, regardless of the position in the syntactic tree.

In the next paragraph, object scrambling in Dutch will be described, followed by the first study. The results of this study support our hypothesis, but may also have been caused by pragmatic influences. A short description of the topic-focus theory will be given, that might also explain the data. The second study, however, shows that this is not the case and that it is movement of the object over an adverb causes the problems. This is in contradiction with the theories of Hagiwara (1995), Friedmann and Grodzinsky (1997) and additional to Bastiaanse, Hugen, Kos, and Van Zonneveld (2002b). In the last section we will discuss the results and point out some implication.

The basic word order in Dutch is subject–object–verb and there is a movement rule, called Verb Second, which says that in the matrix clause the finite verb must be moved to the second position in the sentence (Koster, 1975). This is illustrated below, where (1) is an embedded sentence and (2) a matrix sentence.

1) V-final
   (de jongen) die een boek leest
   (the boy) that a book reads

2) V-second
   de jongen leest, een boek i
   the boy reads a book

From earlier studies we know that Dutch individuals with Broca’s aphasia have problems with this movement rule: they are significantly worse in producing a finite verb in the matrix clause, where the verb is in Verb Second position, than in the embedded clause, where the verb is in its base generated position (Bastiaanse et al., 2002b; Bastiaanse & van Zonneveld, 1998). The same holds for normally developing children (Zuckerman, Bastiaanse, & van Zonneveld, 2001) and children with SLI (Bastiaanse, van Mol, & Zuckerman, 2002). This is more or less in line with Friedmann’s (2000) predictions: functional projections high in the syntactic tree (in Friedmann’s terminology: ‘above tense’) are difficult to realize in Broca’s aphasia.
In the present study, another typical Dutch movement rule has been tested in Broca’s aphasia, that is, object scrambling. When an adverb is used in a Dutch sentence, its base position is before the object and the verb. This is based on the assumption that the object is a complement (the specifier) of the verb, and hence is adjacent to the verb.

(3) Jan heeft gisteren het boek gekocht
   John has yesterday a book bought
   (John bought a book yesterday)

(4) Jan heeft het boek gisteren gekocht
   John has the book yesterday bought

(6) Jan die gisteren het boek kocht
   John who yesterday the book bought

(7) Jan die het boek, gisteren i kocht
   John who the book yesterday bought
   The object may be ‘moved’ over the adverb, as in (5). This does not change the meaning of the sentence, it is just a pragmatic shift (see below). This can be done both in the matrix (4) and in the embedded clause (7).

Basically, object scrambling is optional, but there are some restrictions. For example, when a pronoun is used, it is obligatory:

(8) *Jan die gisteren hem zag
   John who yesterday him saw

(9) Jan die hem, gisteren i zag
   John who him yesterday saw

In the syntactic tree of an embedded clause, object scrambling can be graphically represented as in Fig. 1. As is shown in this tree, object scrambling is independent of verb movement: the finite verb is in its base-generated position, although in the matrix clause, object scrambling can also occur (see 3–4). As object scrambling in the

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1. When we discuss movement, we mean overt movement. According to Chomsky’s (1995) Minimalist Program movement may also be ‘covert’, at LF. As this kind of movement does not change the order of the sentence, the psychological reality of covert movement is hard to prove empirically.
embedded clause is relatively low in the tree, a study to the performance of Dutch Broca’s aphasics can reveal whether movement operations low in the syntactic tree that violate the canonical structure of the language are difficult.

Therefore, production of scrambled and unscrambled predicates was elicited from agrammatic aphasics. To avoid interference with verb movement, it was chosen to elicit scrambled and unscrambled predicates in the embedded clause, as it is known that the production of the non-moved finite verb is no problem. Friedmann (1999) has pointed out that the production of complementizers is difficult; hence, a sentence completion task was developed in which the complementizer was given. The patient was asked to produce either an unscrambled adverb–object–finite verb string or a scrambled object–adverb–finite verb string.

2. Methods

2.1. Subjects

Eight individuals with Broca’s aphasia (mean age 49.8 years; 4 male, 4 female) were tested. The aphasia type was established by the ALLOC-scores of the Aachen Aphasia Test (Dutch version: Graetz, de Bleser, & Willmes, 1992) and confirmed by the speech pathologist and the experimenter. All subjects were aphasic due to a single stroke in the left hemisphere and were 2 months or more post-onset. None of the patients suffered from apraxia of speech. In Appendix A the data of the individual patients are given.

Six non-brain-damaged speakers served as controls (mean age 55.2; 3 male, 3 female). These subjects performed virtually perfectly on the tests (only one error was made) and, therefore, their data will further be ignored.

2.2. Materials

The subjects were presented with two pictures in which the same person was performing the same action with a different person or object. A sentence was read followed by an incomplete sentence. The subject was asked to complete the last sentence in a similar way. There were two conditions: (1) sentences without movement of the object—the basic order condition and (2) sentences in which the object was moved over the adverb—the scrambled condition. There were 15 sentences in each condition. Two examples are (see Fig. 2):

![Fig. 2. An example of the picture sets of experiment 1.](image-url)
For both conditions the introduction sentence is:
Deze man snijdt de tomaat en deze man snijdt het brood
This man cuts the tomato and this man cuts the bread

**Condition 1 (unscrambled): target = adverb-object-finite verb:**

Tester: Dit is de man die vandaag de tomaat snijdt en dit is de man die...
[Patient: ‘vandaag het brood snijdt’]
Tester: This is the man who today the tomato cuts and this is the man who...
[Patient: ‘today the bread cuts’]

**Condition 2 (scrambled): target = object-adverb-finite verb:**

Tester: Dit is de man die de tomaat vandaag snijdt en dit is de man die...
[Patient: ‘het brood vandaag snijdt’]
Tester: This is the man who the tomato today cuts and this is the man who...
[Patient: ‘the bread today cuts’]

Each set of pictures was used twice, once in the unscrambled and once in the scrambled condition. These sentences were mixed and presented in random order (though the actual order was the same for each subject). More examples of the items are given in Appendix B. The test started with two examples that were repeated until it was clear that the patient understood the task.

The reason to prompt the patient was to avoid interference with word-finding problems. Since the non-brain-damaged speakers performed virtually perfect, all the errors that the Broca’s aphasics made were supposed to result from their aphasia and not from test construction.

### 2.3. Scoring

Self-corrections were allowed and the final answer was the one that was analyzed. If requested, the examiner repeated the cueing sentences one time. A simple correct/incorrect scoring system was used, in which determiner omission was ignored. Post-hoc, an error analysis system was developed on the basis of the most frequently occurring errors: **word order errors** (these are the errors in which the object and adverb change places), **omissions** of a constituent, and **others**.

### 3. Results

#### 3.1. Quantitative analysis

In Table 1, the scores in the two conditions are given. There is a significant difference between the two conditions (Wilcoxon signed rank test: $z = -2.29; p = .022$). This means that sentences with a scrambled order are significantly more difficult than sentences with the canonical order of the constituents.

#### 3.2. Qualitative analysis

In Table 2, the results of the error analysis are given. Omissions frequently occurred, but mainly of the adverb; only one time was the object omitted (in the basic order condition) and this was categorized under ‘others.’

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Total numbers (and mean proportions) correctly completed sentences in the basic order and scrambled sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic order</td>
</tr>
<tr>
<td>Mean</td>
<td>87 (.68)</td>
</tr>
</tbody>
</table>
Neither of the error types is more frequently produced in one condition than the other, although there is a trend for word order errors and the omissions to occur more often in the scrambled condition (word order errors: $z = -1.94, p = .053$; omissions: $z = -1.72, p = .086$; other errors: $z = -1.50, p = .134$).

3.3. Conclusion

The main question was whether a movement operation low in the syntactic tree would compromise production for individuals with Broca’s aphasia. Object scrambling in Dutch is such an operation and the data show that they are poor in producing sentences in which the object has been scrambled. The error pattern raises an important question, though: when the subjects make errors, they either descramble or omit the adverb. Adverb omissions often occur, both in the scrambled and in the basic order sentences. Notice that in both conditions the adverb is constant and omission of the adverb results in a gapping structure of which the grammaticality is questionable (‘dit is de jongen die de tomaat snel snijdt en dit is de jongen die het brood snijdt: this is the boy who slowly cut the tomato and this is the boy who cuts the bread). None of the healthy speakers constructed such a gapping structure. Although the research question was based on syntactic theory, something else than syntax may play a role here. Since the adverb is constant, this is so-called given information, whereas the variable object is new information. So, in the sentence dit is de jongen die het brood snel snijdt en dit is de jongen die de tomaat snel snijdt (lit. this is the boy who the tomato quickly cuts and this is the boy who cuts the bread) ‘quickly’ is the given information. There is a pragmatic theory, called the topic-focus theory, that says that given information should precede new information (see, for example, Sperber & Wilson, 1986). According to this theory, given information may be left out. If the object contains new information, as in the test described above, this constituent will follow the given information, the adverb. When a sentence is presented to the subject with the order adverb–object–verb, in which the adverb is given information, this is in accordance with the topic-focus theory. If, however, the order is object–adverb–verb order (the scrambled order) is presented, with the adverb constant, this is marked. In other words, the fact that the object–adverb–verb sentences are more difficult to produce in the test may not be the result of a syntactic deficit, but of the preference of the aphasic subjects to apply the topic-focus strategy: given information first (which explains the word order errors) or omission of the given information (which explains the adverb omissions).

In order to investigate whether the difference in performance between the two conditions is caused by syntactic or pragmatic constraints, a new test was developed, in which the object was held constant and the adverb varied, as in the sentence: *this is the man who cuts the bread today and this is the man who cuts the bread tomorrow*. If the errors in the first test were caused by a pragmatic preference for the order given information–new information, one expects the scrambled order to be the easiest when the object is held constant. If, however, the error pattern on the first test is caused by a syntactic impairment, one expects the scrambled order still to be more difficult than basic order.

<table>
<thead>
<tr>
<th></th>
<th>Word order errors</th>
<th>Omissions</th>
<th>Other errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canonical order</td>
<td>1</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>Scrambled order</td>
<td>37</td>
<td>36</td>
<td>15</td>
</tr>
</tbody>
</table>
4. Methods

4.1. Subjects

The second test was presented to six of the eight speakers with Broca’s aphasia who participated in the first experiment (patients 1–6 in Appendix A). Five of the six non-brain-damaged speakers who participated in the first experiment were tested on this second test again. They performed perfectly and their results will further be ignored.

4.2. Materials

Again the subjects were presented with two pictures and a sentence that they were asked to complete. An example of the pictures is shown in Fig. 3.

For both conditions the introduction sentence was:
Deze man leest liggend en deze man leest zittend (lit. this man reads lying and this man reads sitting: ‘this man is reading lying down and this man is reading sitting down’).

**Condition 1: target = adverb–object–finite verb ( = new information–given information):**
Tester: Dit is de man die liggend het boek leest en dit is de man die...
[Patient: ‘zittend het boek leest’]
Tester: This is the man who lying the book reads and this is the man who...
[Patient: ‘sitting the book reads’]

**Condition 2: target = object–adverb–finite verb ( = given information–new information)**
Tester: Dit is de man die het boek liggend leest en dit is de man die...
[Patient: ‘het boek zittend leest’]
Tester: This is the man who the book lying reads and this is the man who...
[Patient: ‘the book sitting reads’]

For each condition, there were eight items. The two conditions were mixed and the order of the items was randomized. Two examples were included to explain the purpose of the test. These were repeated until it was clear that the patient understood the task. Eight examples of the items are given in Appendix C.

4.3. Scoring

Scoring was done in exactly the same way as in experiment 1.

Fig. 3. An example of the picture sets of experiment 2.
5. Results

5.1. Quantitative analysis

In Table 3, the mean scores in the two conditions are given. There is a significant
difference between the two conditions (Wilcoxon signed rank test: \( z = -2.12; p = .034 \)). This means that sentences with a scrambled order are significantly more
difficult than sentences with the basic order of the constituents, or, in other words,
that the order new information–given information is easier than the regular given–
information–new information order.

5.2. Qualitative analysis

In Table 4, the results of the error analysis are given. Omissions and substitutions
regularly occurred, but, contrary to what happened in the previous test, now the
objects are left out; only two times the adverb was omitted (in the scrambled con-
dition) and this was categorized under ‘others.’ There is no difference between the
number of word order errors (\( z = -1.50, p = .131 \)) and the number of other errors,
although there is a trend for the latter (\( z = -1.73, p = .08 \)). The number of object
omissions is significantly higher in the scrambled condition (\( z = -2.12, p = .034 \)).

5.3. Conclusion

The second experiment demonstrates that the critical factor that makes production
of sentences in one condition more difficult than in the other is syntactic by nature.
Pragmatic constraints on word order with respect to the order in which information is
given, as suggested by the topic-focus theory, plays no role in Broca’s aphasia.

6. Discussion

The first part of this section will discuss the results and the error patterns that
have been observed. We will then compare our results to the theories mentioned in
the introduction. In the final part we will make a note on sentence comprehension.

The second experiment showed that pragmatic preferences in the structure of a
verbal message do not play a role in Broca’s aphasia. This is not a very surprising
result, since pragmatic deficits have never been considered to be an item in Broca’s
aphasia. Although the data have revealed nothing new in this respect, the errors that

\[
\begin{array}{c|c|c}
 & \text{Basic order} & \text{Scrambled order} \\
 & \text{(new-given information)} & \text{(given-new information)} \\
\hline
\text{Mean} & 39 (.81) & 4 (.08) \\
\end{array}
\]

\[
\begin{array}{c|c|c|c}
 & \text{Word order errors} & \text{Omissions} & \text{Other errors} \\
\hline
\text{Canonical order} & 0 & 5 & 4 \\
\text{Scrambled order} & 6 & 28 & 11 \\
\end{array}
\]
have been produced in both experiments show some remarkable things. It is interesting is that in both the basic order and the scrambled order, the main error is omission of the constituent containing the given information (the adverb in the first experiment and the object in the second), even though this results in doubtful coordinations (‘this is the man who is reading the book slowly and this is the man who is reading fast; ‘this is the man who is reading the book slowly and this is the man who is reading the newspaper). This may mean that individuals with Broca’s aphasia are aware of the pragmatic rule that given information may be left out (ignoring the syntactic rule that this should not be done in a coordinated sentence).

The second interesting phenomenon is that many word order errors are made with the scrambled sentences, but that this error type hardly occurs in the basic order sentences. This error is support for our hypothesis that it is movement that makes the scrambled sentences difficult. It is also interesting that virtually no errors with finite verbs occurred. Although finite verbs are notoriously difficult in Broca’s aphasia, only a few errors are made (one omission, one doubling error, one semantic paraphasia in the first experiment and one verb omission in the second experiment). In an earlier study to Dutch Broca’s aphasia (see Bastiaanse et al., 2002b), it was already shown that finite verbs in embedded clauses are significantly easier to produce than those in matrix clauses, where the verb is moved to second position.

Both experiments showed that object scrambling in Dutch is a difficult operation for speakers with Broca’s aphasia. This finding does not support the theories of Hagihara (1995) and Friedmann (2000), who claim that only operations high in the syntactic tree are difficult. The hypothesis for the present study was that individuals with Broca’s aphasia encounter more problems with syntactically complex sentences, that is, sentences in which one or more constituents have been moved, then with sentences in which the constituents are in basic order, regardless of the position in the syntactic tree. The results support this hypothesis.

6.1. A note on comprehension

Knowing that the production problems in Broca’s aphasia are not limited to certain positions in the sentence, the parallels with sentence comprehension emerge. According to Grodzinsky and co-workers (e.g., Grodzinsky, 2000, 1995; Grodzinsky & Finkel, 1998), comprehension problems are restricted to argument movement in semantically reversible sentences. Other authors suggest that parsing of verb movement is unimpaired (e.g., Friedmann, 2001; Lonzi & Luzzatti, 1995) in Broca’s aphasia. In our view, there are some problems with their theories, in that comprehension of sentences with argument movement, such as passives and object clefts, can be tested more reliably, with the help of a pointing-task with pictures of reversible sentences, than comprehension of sentences in which other word classes have been moved (such as verbs and negation morphemes, as tested by Grodzinsky & Finkel, 1998). Sentences in which the verb is not in basic position cannot be tested in a similar way, that is, with two pictures, one representing a grammatical sentence with verb movement and another one without verb movement. The only possible way to test parsing of sentences with moved verbs is by a grammaticality judgment task, but comprehension of sentences with moved verbs cannot be tested. Also, when we look at parsing, we are left with contradictory findings: Linebarger, Schwartz, and Saffran (1983) found that the performance of their four Broca’s aphasics in judging the grammaticality of sentences with verb movement and NP-movement was equally good. Grodzinsky and Finkel (1998) found a discrepancy between verb and NP movement for only two of their four patients. In the sentences that were ungrammatical with regard to verb movement, however, there was more at stake than
just violation of verb movement restrictions. Their example is *have they could leave town? Here they do not merely test for illegal verb movement, but for verb movement of the wrong auxiliary in combination with an infinitive instead of a participle. These ungrammaticalities are detected by three of their four patients but, in our view, they do not serve as evidence that individuals with Broca’s aphasia ‘understand’ verb movement. Bastiaanse and Edwards (2001) showed that Dutch individuals with Broca’s aphasia are significantly impaired in understanding passive sentences (when compared to active sentences), but that the position of the verb in the active sentences does not affect sentence comprehension. Still, Dutch individuals with Broca’s aphasia are not able to detect violations of verb movement rules. In another study to Dutch, Wiegers (1998) found that individuals with Broca’s aphasia judge well-formed sentences with (matrix clauses) and without (embedded clauses) verb movement correctly, but perform poorly on sentences in which the verb is illegally moved or is illegally in its base position. Taking the results of these studies together, one can conclude that, at this stage, there is no clear pattern of comprehension and parsing abilities with regard to verb movement in Broca’s aphasia.

If we assume, on the basis of the data of Grodzinsky and Finkel (1998) and the Dutch data, that parsing/comprehension of verb movement is not entirely intact, then it is worth re-considering Zurif and Caramazza’s (1976) hypothesis that in Broca’s aphasia there is a central syntactic deficit. This deficit can be further specified: individuals with Broca’s aphasics encounter problems in comprehension and production of non-canonical sentences. In order to test verb movement on-line, we are planning to do a Cross Modal Lexical Priming (CMLP) and a MEG experiment, to evaluate sensitivity to verb movement in Dutch during language processing in Broca’s aphasia. So far, we do not see the necessity to accept two different impairments in Broca’s aphasia. Instead, we suggest one central impairment that affects the ability to comprehend and produce non-canonical sentences.

Appendix A. Information of the participants

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Handedness</th>
<th>Etiology</th>
<th>Months post-onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29</td>
<td>Female</td>
<td>Right</td>
<td>Subarchnoidal left haemorrhage fronto temporo parietal</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>Female</td>
<td>Right</td>
<td>Left subarchnoidal haemorrhage</td>
</tr>
<tr>
<td>3</td>
<td>47</td>
<td>Female</td>
<td>Right</td>
<td>Infarction left medial artery</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>Male</td>
<td>Right</td>
<td>Ischemic stroke left fronto parietal</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>Male</td>
<td>Right</td>
<td>Ischemic stroke left</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>Male</td>
<td>Right</td>
<td>Ischemic stroke due to embolia after myocard infarction</td>
</tr>
<tr>
<td>7</td>
<td>74</td>
<td>Female</td>
<td>Right</td>
<td>Subarchnoidal haemorrhage left</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>Male</td>
<td>Right</td>
<td>Stroke temporo medial, including intern capsule, basal ganglia, and thalamus</td>
</tr>
</tbody>
</table>
Appendix B. Eight examples of the sentences used in Test 1 [between brackets is the expected answer]

1 Dit is de jongen die vandaag de tomaat snijdt en dit is de jongen die...
[vandaag het brood snijdt]
This is the boy who cuts today the tomato and this is the boy who...
[today the tomato cuts]

2 Dit is de vrouw die nu de jongen groet en dit is de vrouw die...
[nu het meisje groet]
This is the woman who now the boy greets and this is the woman who...
[now the girl greets]

3 Dit is het meisje dat de man plotseling omhelst en dit is het meisje dat...
[de vrouw plotseling omhelst]
This is the girl who the man suddenly hugs and this is the girl who...
[the woman suddenly hugs]

4 Dit is het meisje dat plotseling de stok gooit en dit is het meisje dat...
[plotseling de bal gooit]
This is the girl who suddenly the stick throws and this is the girl who...
[suddenly the ball throws]

5 Dit is de vrouw die de trui thuis breit en dit is de vrouw die...
[de sok thuis breit]
This is the woman who the sweater {athome} knits and this is the woman who...
[the sock {at home} knits]

6 Dit is de hond die de vrouw plotseling krabt en dit is de hond die...
[de man plotseling krabt]
This is the dog that the woman suddenly scratches and this is the dog that...
[the man suddenly scratches]

7 Dit is het meisje dat plotseling de hond ziet en dit is het meisje dat...
[plotseling de kat ziet]
This is the girl who suddenly the dog sees and this is the girl who...
[suddenly the cat sees]

8 Dit is de jongen die de hond nu aait en dit is de jongen die...
[de kat nu aait]
This is the boy who the dog now pets and this is the boy who...
[the cat now pets]

Appendix C. Eight examples of the sentences used in Test 2 [between brackets is the expected answer]

1 Dit is de man die blij de vis vangt en dit is de man die...
[boos de vis vangt]
This is the man who happily the fish catches and this is the man who...
[angrily the fish catches]

2 Dit is de man die 's middags het ei bakt en dit is de man die...
['s nachts het ei bakt]
This is the man who {in the afternoon} the egg fries and this is the man who...
[{at night} the egg fries]

3 Dit is de man die het boek liggend leest en dit is de man die...
[het boek zittend leest]
This is the man who the book {lying down} reads and this is the man who...
[the book {sitting down} reads]
Dit is de man die slordig de brief schrijft en dit is de man die... [netjes de brief schrijft]
This is the man who slovenly the letter writes and this is the man who...
[neatly the letter writes]

Dit is de man die nu het lied zingt en dit is de man die... [straks het lied zingt]
This is the man who now the song sings and this is the man who...
[later the song sings]

Dit is de man die de boom vandaag plant en dit is de man die... [de boom morgen plant]
This is the man who the tree now plants and this is the man who...
[the tree tomorrow plant]

Dit is de man die het zandkasteel langzaam bouwt en dit is de man die... [het zandkasteel snel bouwt]
This is the man who the sandcastle slowly builds and this is the man who...
[the sandcastle quickly builds]

Dit is de man die maandag de ramen lapt en dit is de man die... [woensdag de ramen lapt]
This is the man who Monday the windows cleans and this is the man who...
[Wednesday the windows cleans]

References


